Re-sampling of Common Areas and Aggressively Sampled Apartments

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World Trade Center Expert Technical Review Panel

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Additional information on two issues discussed at the March 31, 2004 Expert Panel Meeting

- Sampling of apartments sampled using the “aggressive” sampling method in the previous study
- Sampling of common areas sampled in the previous study

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Sampling Plan Presented at the March 31 meeting involved assignment of apartments to different strata:

Population of 4,167 apartments stratified by

1. **"Cleaned and tested" versus "tested only"**

2. **"Modified aggressive sampling" versus "aggressive sampling"**

3. **Different findings for asbestos:**
   - **Non-detect**
   - **Detected at or below benchmark**
   - **Above benchmark**
   - **No asbestos result; overloaded filter**

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Modified and Aggressive Sampling Comparison

	Modified Aggressive	Aggressive
Occupancy Simulation	20 inch fan run for duration of testing	A one-horsepower leaf blower is used to direct a jet of air towards the corners, walls,fabric surfaces and ceiling to dislodge and resuspend fibers and dust. 20 inch fan run for duration of testing.
Preparation	None	Occupant must remove pictures, paintings, or other wall hangings, remove items from shelves and flat surfaces, secure items that can blown over and damaged.
Occupancy	Occupants may remain.	Occupants may not remain.
Re-entry	N/A	Occupants may not re-enter for 48 hours after testing.

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Aggressive Sampling Support

- Aggressively sampled apartment residents will require:
  - Lodging and meals for 2-3 days
  - Relocation of pets
  - Transportation to schools, etc. if local accommodation is not feasible
  - Other additional support

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Domain 1 – Counts of all 4167 apartments by clean/test status & sampling method

		Modified Aggressive	Aggressive
Clean and Test			
	Non-detect	**2870**	**201**
	Detect	**194**	**20**
	Exceed	**20**	**15**
	Overload	**62**	**6**
Test only			
	Non-detect	**677**	**31**
	Detect	**39**	**0**
	Exceed	**8**	**1**
	Overload	**23**	**2**
	Totals	**3893**	**274**

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Aggressive sampling produced different results in comparison with Modified Aggressive:

Higher rates of exceedances of health-based benchmark, apartments with detected samples and apartments with overloaded samples

	Aggressive	Modified
Exceedances:	**5.8%**	**0.7%**
Detected:	**7.3%**	**5.9%**
Overloaded:	**2.9%**	**2.2%**

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Aggressive Sampling Results

	Clean & Test	Test Only	Total	Rate
No. of Apts.	240	34	274	_
No. Apts. with at least 1 exceedance	15	1	16	0.0584
No. Apts. with at least 1 overload	6	2	8	0.0292
No. of Samples	1396	212	1608	_
No. of Samples w/exceedances	47	1	48	0.0299
No. of Samples w/overloads	14	5	19	0.0118

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Sampling to estimate the number of apartments exceeding the benchmark in the aggressively sampled apartments

				95% Confidence Limits on True Number	
Pop. Size	Sample Size	Assumed Number in Pop.	Number in Sample	Lower Limit	Upper Limit
274	50	14	3	6	44
274	100	14	5	8	28
274	150	14	8	10	25
274	200	14	10	11	20
Note: No adjustment of sample size for non-response					

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Aggressive vs. Modified Aggressive Sampling

- Aggressive sampling in apartments sampled previously with aggressive sampling would provide a comparable basis for assessment of re-contamination
- Modified sampling results from the 274 could be used to estimate overall contamination rate in the population of 4,167 but could not be used in the comparison with the previous results
- Aggressively sampled sampled apartments could not be used with modified aggressive sampling results to estimate overall current rate of contamination
- Non-response in aggressive sampled group will likely be a logistical and statistical problem (non-response bias)

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Sampling of common areas in buildings sampled previously

- Separate survey from the survey of apartments
  - Building is the unit of analysis rather than apartment
  - Logistics could be coordinated with the apartment survey but the objective would be different
  - Objective: Estimate the contamination rate in building common areas that were sampled previously

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Common area sampling results from the clean up study

Building HVAC Class	Number of Buildings	Number of Samples	Number of Exceeds	Number of Detects	Number of Overloads
“Common”	41	3950	5	60	94
“Exhaust”	43	1229	5	31	18
“No”	14	139	0	2	1
“Unknown”	36	617	11	24	19
“Yes”	9	456	0	7	12
Totals	143	6391	21	124	144

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Building HVAC Classifications

"Common": building has a common area HVAC system only

"Exhaust": building has central exhaust for kitchens and baths

"No": building does not have common area or central HVAC

"Unknown": central HVAC status is unknown

"Yes": building has central HVAC and exhaust for kitchens, baths

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Common area sampling results: buildings with measurements exceeding the benchmark

Building HVAC Class	Number of Buildings	Number of Samples	Number of Exceeds	Number of Detects	Number of Overloads
“Common”	5	701	5	21	5
“Exhaust”	4	406	5	22	12
“No”	none				
“Unknown”	2	214	11	21	7
“Yes”	none				
Totals	11	1321	21	64	24

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Survey of common areas previously sampled

- Comparability to previous results would be limited
- Previous study sampled about 800 distinct locations within common areas of 143 buildings
- Repeat sampling at the 800 locations problematic
- New survey objectives would have to limit sampling locations due to resource, logistical and statistical considerations
  - E.g., sample to estimate rate of contamination in building lobbies

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Sampling to estimate the number of buildings exceeding the benchmark in the common area sampled buildings

				95% Confidence Limits on True Number	
Pop. Size	Sample Size	Assumed Number in Pop.	Number in Sample	Lower Limit	Upper Limit
143	50	1	1	1	12
143	100	1	1	1	5
Note: No adjustment of sample size for non-response					